



# PTC THERMISTORS: YS4019, YS4020, YSM4021

## OVER-CURRENT PROTECTION

### DESCRIPTION:

A range of three high voltage PTC thermistors. Types YS4019 & YS4020 have radial wires and a conformal coating; type YSM4021 has a lead frame construction suitable for surface mount applications.

### FEATURES:

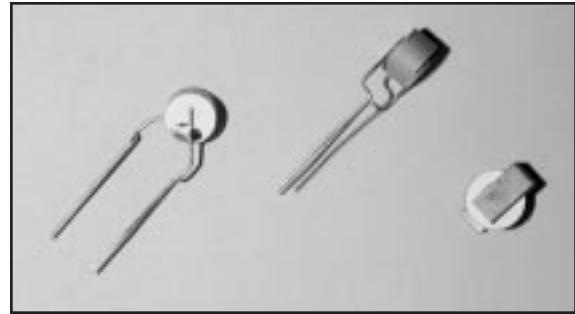
- Designed for over-current and over-voltage protection at voltages up to 1000V r.m.s.
- Ability to withstand direct connection to 1000V r.m.s. supply
- Suitable for resettable input protection of digital multimeters and other instrumentation
- Excellent stability
- Fail-safe operation
- Solid state
- High performance barium titanate ceramic

### OPTIONS:

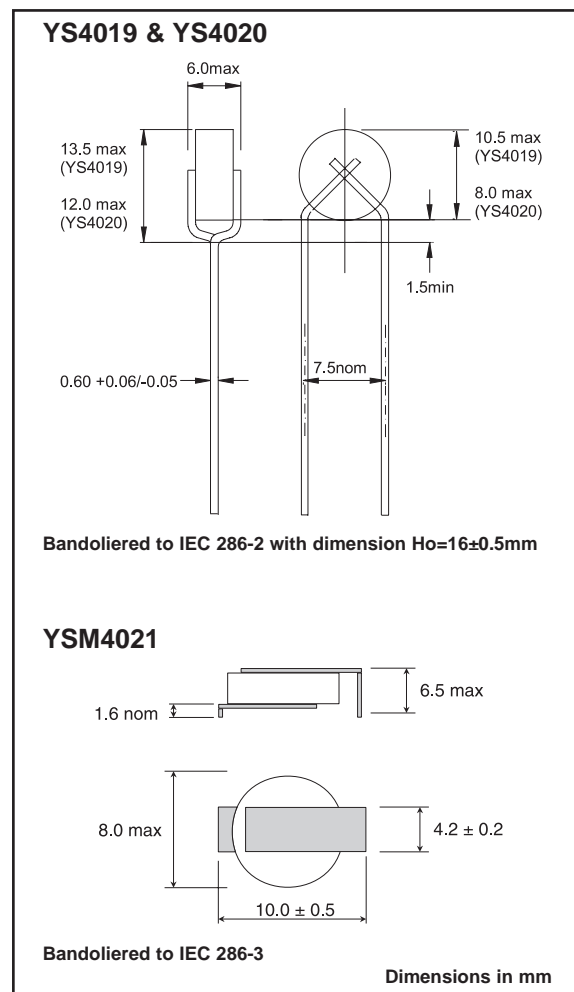
- Non-standard resistances and tolerances
- Resistance matching
- Non-standard wire lengths
- Other wire configurations

### DATA:

**Tolerance on  $R_{25}$**  .....  $\pm 20\%$   
**Maximum operating voltage** ..... 1000 r.m.s.  
**Switch temperature  $T_b$**  .....  $80 \pm 10^\circ\text{C}$   
**Ambient temperature range:**  
**at maximum voltage** .....  $-20$  to  $+60^\circ\text{C}$   
**at zero voltage** .....  $-25$  to  $+125^\circ\text{C}$   
**Lead wire material (YS4019 & YS4020)**  
 ..... Solder-coated copper  
**Lead frame material (YSM4021)**  
 ..... Solder-coated brass



### DIMENSIONS:



Code	$R_{25}$ $\Omega$	Resistance $-20$ to $+55^\circ\text{C}$ $\Omega$	Residual current at $25^\circ\text{C}$ mA
YS4019	500	1000 max	<3
YS4020	1100	2000 max	<2
YSM4021	1100	2000 max	<2



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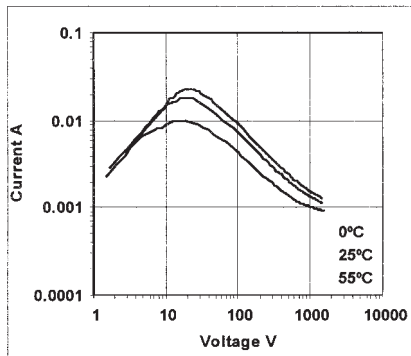
#### SWITCHING TIMES:

Initial current mA	Maximum trip time (secs)	
	YS4019	YS4020 & YSM4021
50		25
100	30	4.0
200	4.2	1.0
500	0.70	0.16
1000	0.21	0.05
2500	0.1	

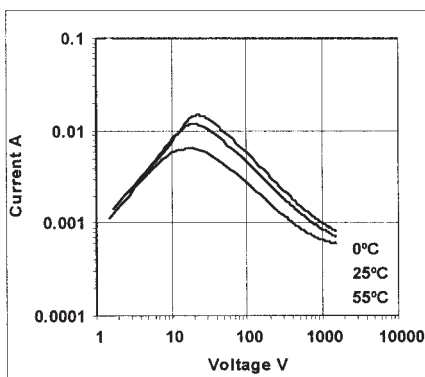
Thermistor connected to a 1000V r.m.s. supply via a series resistance, adjusted to set the initial current. Switching time defined as the time required for the current to reach 1/3 of the initial current at an ambient temperature of 25°C.

#### CURRENT-VOLTAGE CHARACTERISTICS:

##### YS4019



##### YS4020 & YSM4021



#### INSTRUMENT PROTECTION

**The input circuitry of digital multimeters and other instrumentation requires over-current protection against the unintentional fault conditions which can occur. PTC thermistors offer reliable, convenient and cost-effective protection. Solid state construction allows resettable operation, eliminating the inconvenience of fuse replacement.**

Modern multimeters, with wide-ranging functions, are particularly at risk. The inadvertent application of a voltage source to an instrument in resistance mode will cause excessive currents within the input circuitry. Multi-channel instruments, such as oscilloscopes, are also susceptible if the ground terminals are raised to high potential. These high currents, if unchecked, would destroy the input circuitry.

The PTC thermistor is connected directly in series with the input terminals. It is chosen so that over the expected range of working conditions (current, voltage, ambient temperature) the device remains in a low resistance state, offering as little series resistance as possible to ensure accurate measurement.

When a fault condition occurs, the abnormally high current causes sufficient  $I^2R$  heating in the thermistor to switch it from low to high resistance, reducing the circuit current and preventing damage.

After removal of the fault condition, the thermistor reverts to low resistance to re-establish normal operation. Devices can be chosen to achieve automatic reset (fault condition must be removed) or manual reset (power source disconnected).